

**Monitoring Translocated Riparian Brush Rabbits
and Surveying for and Censusing of Brush Rabbits and Woodrats**

by

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Reintroduction of endangered riparian brush rabbits, bred in captivity, to historical habitat on the San Joaquin River National Wildlife Refuge began in August 2002 (Williams et al. 2002). Through 20 September 2002, 41 rabbits had been moved to the Refuge and an estimated 9 to 12 were yet to be translocated (ESRP unpubl. data). Subsequent reintroductions on the Refuge and elsewhere will take place as progeny from the controlled propagation program become available in 2003 through 2005 or 2006, depending on productivity of the confined population, responses of reintroduced populations, and availability of other protected habitat where reintroductions would be appropriate. Other potential reintroduction sites have been identified along the Lower Stanislaus River and along the San Joaquin River. The latter site, along the east bank of the River, is on private property but part of the San Joaquin River National Wildlife Refuge (NWR).

This proposal is a part of the U.S. Fish and Wildlife Services' proposal for FY 2003 funding that is being re-submitted to CalFed (Bell 2002). Our proposal seeks funding for: population censuses, monitoring, and habitat evaluation of translocated riparian brush rabbits on the San Joaquin River NWR; surveys and population censuses of riparian brush rabbits and woodrats in the proposed Lower Stanislaus River Preserve (Bell 2002); populations censuses of riparian brush rabbits and woodrats in Caswell Memorial State Park (MSP); and consultations by ESRP with the Service and Sacramento River Partners on riparian community restoration and management, and provisions of refugia for brush rabbits from floods, as detailed in Service's CalFed re-submitted proposal (Bell 2002). Our proposal consists of four inter-related tasks.

***Monitoring riparian brush rabbits translocated to restored habitat
at the San Joaquin River National Wildlife Refuge***

Currently, one site on the San Joaquin River NWR (Figure 1) has been protected by having a mound of earth higher than the levee on the water side of the levee (Dennis Woolington and Scott Frazier, U.S. Fish and Wildlife Service, pers. comm.). This mound is vegetated with native shrubs and vines that provide cover and food for brush rabbits. It also has a good cover of herbaceous vegetation. Contiguous to this site along the stream side of the levee are approximately 7.5 acres (3.04 hectares) of continuous brushy habitat

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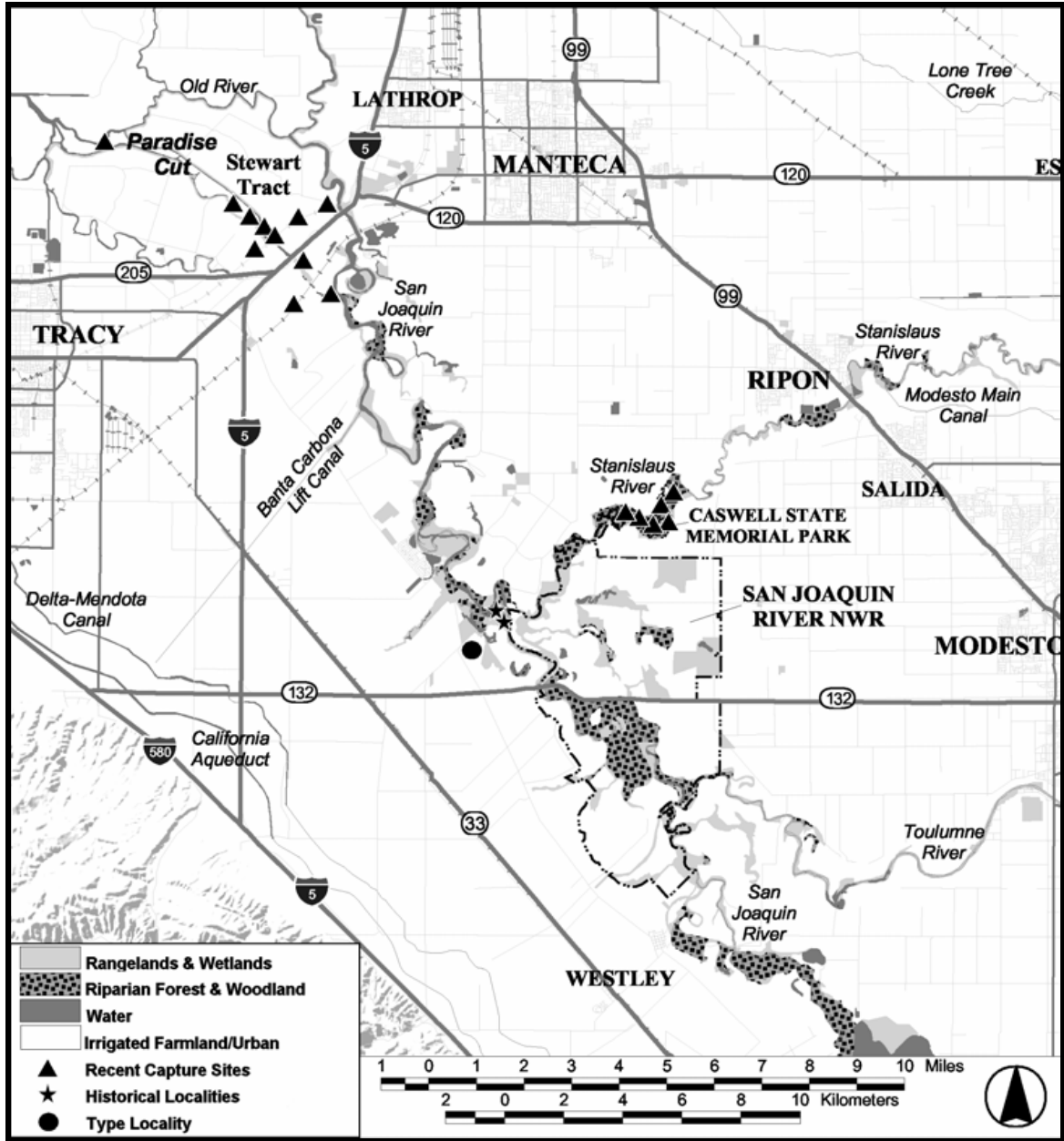


Figure 1. Historical and recent (current) records for the riparian brush rabbit, *Sylvilagus bachmani* riparius. Shaded relief in the lower left of the map is upland non-native grassland and chaparral.

for riparian brush rabbits (ESRP unpubl. data). Other clumps of suitable brush are located at various distances from the protected site and probably would be accessible to dispersing rabbits when herbaceous annual plants provided suitable cover. We estimate that the easily accessible (i.e., without crossing sloughs or canals) habitat at the release site is approximately 133 acres and that the total contiguous habitat extant on the refuge is about 1,016 acres. We think that this area west of and on Christman Island (all on the Refuge) could become naturally populated from translocations to this 7.5-acre site.

Prior to translocating rabbits, the release area will be thoroughly censused for predators, particularly hawks, owls, feral cats, bobcats, foxes, and coyotes. If predators are found living within the area of the release site, some may be trapped and relocated away from the release site, and in choosing the release site, the presence of potential predators will be considered. Nest boxes and escape structures (4 ft lengths of 6" PVC pipe) will be scattered throughout the 7.5-acre habitat area on the refuge.

After disease screening (Williams et al. 2002), rabbits will be trapped, moved from the controlled propagation facility, and placed in a temporary, pre-release enclosure of habitat about 1 acre in size, depending on amount and configuration of available high-quality habitat that can be fenced without major disruption to the plant community. Enclosures will consist of 6-ft high poultry wire. The wire will be buried about 6 inches to 1 foot in the ground and supported by T-posts. Rabbits will be confined to allow them to become adjusted, as shown by behaviors monitored by radio-telemetry and direct observation. Rabbits will be monitored daily while confined to the pre-release pen. Rabbits will be confined a minimum of 5 days. The enclosure then will be opened to free the rabbits. We expect that some rabbits might escape before the enclosure is removed. We hypothesize that by confining the rabbits for a few days they will become familiar with places to shelter and retreat and become acquainted with some of the other individuals released at the same time. We expect that this will decrease their tendency to disperse widely when released and give them some additional protection from predators.

Rabbits in the pre-release pen, those freed from the pen, and any that escaped will be monitored by radio-telemetry periodically. We have several objectives for post-release monitoring:

1. Determination of status (alive or dead) and location will be made weekly or bi-weekly for each rabbit's lifetime:
 - a. Are there differences in survivorship among age classes? Sexes? Those that disperse versus those that do not? Is mortality related to dispersal distance?
 - b. What are the primary causes of mortality in translocated individuals?
 - c. If a primary cause of mortality is predation, can specific predators be identified?
 - d. What habitat features are related to home ranges of rabbits that were prey versus those that survived?
2. Determination of home range, core areas, dispersal, and periods of peak activity for a subset of individuals ($n = 20$) by season:
 - a. What home range and core area sizes will be established by the released rabbits?

- b. How quickly will these home ranges/core areas be established?
 - c. Are differences in home range and core area sizes related to age classes?
Sexes? Seasonality? Habitat features?
 - d. Do dispersal rates vary among age classes? Sexes? Seasons?
3. Quantification of the spatial configuration of a group of individuals ($n = 20$) in a defined area:
- a. Do individuals overlap in home ranges or core areas?
 - b. If so, are there patterns in overlap based on gender? Age? Season? Habitat features?
 - c. Do home ranges or core areas change seasonally with cover?
 - d. What is the relationship between cover types and time budgets of rabbits?
4. Quantification of reproduction of translocated individuals:
- a. How many individuals reproduce in the first season following translocation?
 - b. Among reproducing individuals, what is the average litter size?
 - c. How many litters does each female produce per season?
 - d. How does this reproductive information compare with reproductive rates in the captive colony.

We believe that measuring reproduction is essential for determining success of translocation and to future decisions on translocations to the Refuge. Yet, we expect that quantification of reproduction in the wild population will be difficult and largely incomplete because of the secretive nature of brush rabbits, and because we believe that the amount of trapping and handling that would be required to obtain a robust data set would be too risky for the animals. Trapping involves risks of injury or death from rare accidents and from predators disturbing animal confined in traps. Repeated trapping also causes some individuals to avoid traps in the future, resulting in incomplete information on the reproductive history of those rabbits.

Methods

Radio-collared rabbits will be hand tracked using 2-Element “H” style directional antennas (Telonics; Mesa, AZ) and directional five-element antennas and portable

receivers (model R1000; Communications Specialists). Five-element antennas will either be mounted on vehicles or placed at permanent telemetry stations.

Tracking will occur during one of four monitoring stages (0400-1000 h, 1000-1600 h, 1600-2200 h, and 2200-0400h). These stages will allow us to identify times of peak activity. Once identified, periods of low activity may be reduced or eliminated for further monitoring. Initially, tracking will occur during a different period (alternating among the four) each monitoring day.

Upon release from the enclosure, rabbits will be monitored daily for the first 5 days. Each animal will be located and its status determined from radio signals. At the end of the 5 days, we will continue monitoring approximately every other day until they appear to have settled into an area. We estimate this less intensive monitoring will proceed for 1-3 weeks. Subsequently, all rabbits will be monitored to detect mortality approximately twice per week every week.

On four occasions (August [end of extended breeding season], November [before breeding season starts], February [during breeding season], and May [end of typical breeding season]) intensive tracking sessions will be conducted to assess 24-h movements of a sub-set (20 individuals) of radio-collared rabbits over 2 to 3 successive days. After 40-50 location fixes have been gathered for the subset of intensively monitored rabbits, we will calculate a home range area curve to determine the number of locations necessary for reliable estimates. After 4-6 weeks, we will calculate home ranges and core areas for the subset of rabbits from location fixes taken weekly versus biweekly. Based on these results, monitoring may be reduced in frequency.

Signals will be followed to determine which patch of vegetation a rabbit is using. We will locate the rabbit in the patch (typically dense thickets of wild roses or large clumps of blackberries) by walking around it with the antenna disconnected from the receiver, but with a coaxial cable attached to the transmitter antenna jack and fixed to a 6-10-ft pole. The animal's position will be estimated to within a few meters. Once located, the rabbit's position will be recorded in UTM coordinates with a global positioning system (GPS). The time, weather conditions, signal quality, and habitat patch in which the rabbit is located will be recorded.

When and where the previous method of location proves too difficult or disruptive to rabbits, triangulation will be used. To acquire location information, bearings will be taken simultaneously by two researchers on radio-collared rabbits. Synchronous collection of bearings will be achieved by communication via cellular phones or hand-held radios. Each researcher will carry an active radio-collar or beacon. For each location fix, a total of four bearings will be collected, one from each researcher to the rabbit and one from each researcher to the other. Locate II (Pacer software, 1990) or an ArcView® (Environmental Systems Research Institute, Redlands, CA) program extension will be used to estimate rabbit locations. The time, weather conditions, and signal quality will be recorded by each researcher for every location fix. Initially, readings on collared individuals will be separated by at least 1 h to prevent

autocorrelation of the data. According to Swihart et al., (1988) location fixes should be separated by about 5 h to prevent autocorrelation. We propose starting with hourly readings and re-calculating the time to independence after 2-4 weeks with the formulas provided by Swihart and Slade (1985).

To evaluate researcher error, location fixes will be taken on carcasses prior to their collection. Once the carcass is found a GPS reading will be taken at the site and the calculated position will be compared with the known location (Bond 2001). Additionally, or alternately, we will hide radios from researchers and test the accuracy of the telemetry system periodically. The telemetry system also will be calibrated prior to each session. Telemetry stations will be established along the perimeter of the release pen and levees. A survey grade GPS Pathfinder Pro XR/XRS (Trimble Navigation Limited, Sunnyvale, CA) unit will be used to mark the locations of the telemetry stations and to identify landmarks and access roads not shown on United States Geological Survey (USGS) maps.

Habitat patches will be floristically described and measured, and mapped using GPS. Spatial data will be transferred to ArcView®. Data from GPS units, USGS maps, floristic characteristics, and location fixes will be compiled in a geographic information system (GIS) for analyses of habitat use, dispersal routes, home ranges, and core areas. A software package such as CAL HOME or HOME RANGE will be used to calculate home range and core areas.

Trapping to refit collars will need to be done sometime between about December and May. Captured brush rabbits, desert cottontails, woodrats (unlikely at the San Joaquin NWR), and black rats (*Rattus rattus*) will be permanently marked with metal ear tags and rabbits and woodrats also will be marked with PIT tags, weighed, and measured. A 2-3 mm diameter plug of ear tissue will be taken with a biopsy punch from brush rabbits and woodrats and preserved in 95% ethanol (reagent grade, not denatured). Animals will be released at the site of capture.

Between January and July, we will trap a minimum of 5 days per month to assess reproduction of the translocated population, mark young rabbits, and refit lost or failing radio transmitters. Additional trapping may be required if the occupied area becomes too large or if initial efforts are not successful. A subset of subadult riparian brush rabbits (> 400 g) captured on the refuge will be fitted with radio-collars to assess their movements and survival. Trapping to estimate population size (censuses) will be conducted for 10 days in March and September of the year following the first release and in ensuing years. The number of traps will depend on the size of the area, which will depend on the size and shape of occupied habitat. No less than 100 traps will be operated simultaneously, however. Subsequent censuses will involve the same number of traps in the same area so that season to season and year to year comparisons can be made. Traps will be located where they are most likely to capture rabbits—in runways, along logs, in dense brush, and areas where relatively fresh sign of rabbits are evident. Captured animals will be identified and their weight, sex, and reproductive condition will be recorded. Unmarked

brush rabbits will be permanently marked with ear and PIT tags, and radio-collared if they are of sufficient size (i.e., $> \sim 400$ g).

Dead rabbits will be collected following the procedures outlined by Gilardi (in Williams et. al 2002): “If a rabbit dies after release, and the carcass is recoverable, the carcass should be necropsied by a veterinary pathologist at UC Davis (Dr. Linda Munson, Chief of Service, Diagnostic Pathology, Veterinary Medical Teaching Hospital; or Dr. Karen Terio, same), and a full histopathological evaluation should be performed, including special tests as recommended by the pathologist. The carcass should be clearly identifiable (via ear tag), double-bagged in heavy plastic, and the bag labeled with Genus species, common name, identification number of rabbit, date of death (if known), date of carcass collection, and weight of carcass. The bagged carcass should be placed in a refrigerator, and delivered as soon as possible to UC Davis during normal business hours.”

Spatial, trapping, and habitat data and necropsy results will be entered into electronic databases for storage, summary, and analyses. Results of monitoring and censuses will be reported periodically to the permit-issuing agencies and the Riparian Brush Rabbit Working Group. Data will be summarized in an annual report and in shorter, focused reports for use in habitat restoration and management.

Censuses, Surveys, and Habitat Restoration along the Stanislaus River

This section of our proposal deals with activities in the proposed Lower Stanislaus River Preserve. These activities arise out of the need to prepare sites for future translocations of brush rabbits from the controlled propagation facility (Williams et al. 2002), and to develop and implement habitat restoration and management on property proposed for acquisition in Service’s CalFed proposal (Bell 2002).

Biological Surveys within the Lower Stanislaus River Preserve

Biological surveys, focusing on the riparian brush rabbits and riparian woodrat, and habitat evaluation of the property targeted for acquisition and restoration within the proposed Lower Stanislaus River Preserve will provide information for the immediate riparian restoration and flood refugia actions necessary for preparing a site for the future release of captive-bred brush rabbits, and provide additional information for the Restoration and Management Plan (Task D in the Service’s CalFed proposal, Bell 2002). If permission is granted by the owners of the Faith Ranch, which is within the San Joaquin River NWR, we also will trap and assess the riparian community along the eastern bank of the San Joaquin River between the mouth of the Stanislaus River and State Highway 132. In the following discussion, “lower Stanislaus River” also includes any property we can access along the San Joaquin River.

The surveys will (1) determine the presence of the brush rabbit, woodrat, other sensitive terrestrial species, and non-native species; (2) assess and map location and quality of habitat for brush rabbits and woodrats; (3) evaluate risk factors including threats from non-native and native species. With this information we will propose potential sites for restoration and refugia needs for the future release of the brush rabbits.

Methods

The properties first will be searched for woodrat houses, runways made by rabbits, fecal droppings, and other sign of both species. Areas where signs are noted or where the plant community provides potential habitat will be trapped with Tomahawk, double-door traps according to the survey protocols for these species (Williams and Kelly 1993a, 1993b). We expect that surveys will require a minimum of 5 days of trapping on 4 separate portions of the proposed Preserve area, for a total of 20 days of trapping with a minimum of 100 traps. The property will be subdivided depending on size of natural features and trapped for 5 days in each area. Traps will be placed where they are most likely to capture brush rabbits or woodrats (e.g., Williams et al. 2000). Using GPS and GIS technology, capture sites and occupied and potential habitat will be mapped, and the habitat features will be characterized as to species composition and vegetative structure. A summary report will be prepared detailing findings and recommendations for use in immediate planning for community restoration and construction of mounds to serve as refugia from flooding for at-risk terrestrial species. Days required for data management, analyses, and summary by various staff are detailed in Table 1.

Riparian Brush Rabbit Population Census and Habitat Restoration Work at Caswell MSP

In January, annual populations censuses at Caswell MSP were conducted in 1993 and 1997-2002 (Williams 1993, Williams et al. 2000, ESRP unpubl. data). Censuses provide data for evaluating the status of brush rabbits and woodrats (woodrats are caught in the same traps) and determining population fluctuations in response to weather and periodic flooding. Continuing the censuses will provide essential information on the restoration work within the expanded area of the Park being requested in Service's CalFed proposal (Bell 2002).

Methods

Censuses consisted of 7 continuous days of trapping with 100-120 Tomahawk traps in three separate, defined areas of the Park, for a total of 21 days of trapping. Trapping occurs only during the afternoon and evening hours to prevent undue stress and exposure to cold or wet weather to the animals confined in traps during this winter period. Within each census area, traps are placed where there is the highest likelihood of captures: along logs and other natural paths, in runways, near woodrat houses, and where sign of either

rabbits or woodrats are found. Data are converted to captures per unit effort for year to year comparisons, and depending on the number of captures and recaptures, population estimates are calculated using closed population models available, for example, in the program Capture (White et. al 1982). General methods are described in more detail in Williams (1993) and Williams et al. 2000.

A final report will be prepared listing captures and population estimates, where possible, and discuss results in the context of previous censuses, changes in flooding and weather, and other possible changes in the species environment. Total captures and capture-recapture rates have been too low since 1997 to calculate a population estimate with statistical models. Personnel resources for this activity are detailed in Table 1.

Consultation on Habitat Restoration, Management, and Refugia Placement

The Process that Service is proposing to CalFed (Bell 2002) includes purchase of fee-title or wildlife habitat easement and restoration and protection of riparian habitat for brush rabbits and woodrats in the Lower Stanislaus River Preserve area and at Caswell MSP. ESRP will have a consulting role in the design and implementation of restoration and management plans. We estimate that this work will require about five meetings, three site visits to each area, and other consultations by phone and e-mail. These activities will be conducted primarily by the co-principal investigators, D.F. Williams and L.P. Hamilton, and to lesser extents by our biological planner, Connie Lee, and co-principal investigator and ESRP Director, Patrick Kelly. The estimated times spent on these activities for each of these individuals assume that ESRP will not be preparing restoration and management plans for these properties, but merely consulting with those who do during FY 2003. If ESRP is later asked to assume this role or to continue consultations beyond FY 2003, additional funding would be required and we would submit a proposed amendment in a later year or seek another source of funding.

Estimated Resources and Budget

The nature of this research will require more than a crew of two field researchers on most occasions, and more than three field biologist positions overall (Table 1). Implementation will be merged with other activities of controlled propagation, species surveys and censuses, habitat evaluations, and other recovery activities for riparian brush rabbits and woodrats for better use of personnel and other resources. For safety as well as logistic reasons, field crews nearly always consist of a minimum of two researchers. Table 1 lists main tasks covered in this proposal and the estimated person days required, assuming an 8-hour day. Estimated times include time to assemble equipment, drive to the study site, and store equipment after returning. Some tasks are subdivided by duties performed by personnel with different classifications or salary levels. Biologist salaries are presented as the mean of the biologists working on this project because they will be rotated between this and other ESRP recovery projects, including those on brush rabbits and woodrats, such as controlled propagation and woodrat-black rat interactions.

The estimated person-days for biological field tasks (Table 1) exceeds the number of annual work days for three field biologists (837 days = 3.2 work years). There undoubtedly will be unanticipated events that prolong some tasks and require others that are not included in the estimates. Reducing field time could counter these unexpected costs. We expect some assistance from volunteers, and the Director and principal investigators will perform some field work for this project that is not factored into the budget estimates, which also will help contain unbudgeted costs. We also think that some monitoring can be reduced once we have initial data on activity periods.

Other needed resources include funds to rent or lease one vehicle for use full-time on the project and to operate one vehicle part-time and one ATV owned by ESRP. The ATV is used for work on the Refuge and to access Pond 6 during wet weather. Also needed are 100 specially-made Tomahawk-brand, double-door live traps, 100 radio collars per year (50 to replace collars on rabbits released in 2002 as their batteries fail, 50 to replace dead and lost transmitters for rabbits released in 2003 and those fit collars on those born on the refuge), 2 5-element antennas, 2 radio-receivers, 4 citizen-band radios, office rental, phones, copying, postage, and miscellaneous expendable field and office supplies (Table 2).

The resource requirements outlined above are detailed in the following budgets for Years 1-3. The Year-2 budget assumes a 5% combined performance increase and cost-of-living increase for salaries and a 2% increase in costs of goods and services, but no increase in some negotiated rental rates (office, vehicle). The Year-3 budget assumes a 4% combined performance and cost-of-living increase and a 2% increase in costs of goods and services including office rental and rental of storage space.

The negotiated indirect cost rate between the U.S. Fish and Wildlife Service and the Endangered Species Recovery Program is 20%. Most is used by the University to cover their accounting and banking costs and administration of the grant or contract. ESRP receives just 3% of direct costs to cover all its other expenses. ESRP expenses for office rental, depreciation of equipment and vehicles, and insurance (ESRP is not a state program and is not self-insured), and miscellaneous operating expenses cannot be recouped from this 3%. These expenses have to be provided for in the budget, either as direct expenses (such as office rental, phones, etc.), or, for depreciation of equipment used in executing the project such as vehicles (when "owned" by the program or university), computers, printers, and various items for field and office work, by assessing a "program" cost based on direct cost. For this proposed project the program cost rate is calculated at 5%. The rate varies depending on how a budget is structured and the nature of the project and the resources it requires. Program costs are part of direct costs. If these sorts of program costs must all be included as indirect costs, the University will take three-quarters as their split of ALL indirect cost recovery and ESRP will not be able to recoup its expenses. For granting and contracting entities that do not allow these "program" costs as part of direct cost, the indirect cost rate is 45-47%.

Table 2 details estimated costs for the combined projects in this proposal for Fiscal Year 2003. Tables 5 and 6 show costs for fiscal years 2004 and 2005, respectively.

Table 1. Estimated annual times in person-days (8-h work days) for completion of major tasks in this proposal during FY 2003-2005. A work year is calculated at 260 days.

Project, Position, and Task	# of Persons	Days	Times/ Year	Total Days
San Joaquin River NWR Monitoring and Censuses				
Field Biologists				
1 st week Post Release Monitoring	2	5	5	50
2 nd -4 th week Post Release Monitoring ¹	4	9	5	180
Weekly mortality monitoring (above monitoring subtracted)	2	2	40	160
Intensive activity and space use monitoring	6	3	4	72
Habitat mapping and measurement	2	20	1	40
Trapping to replace or refit radio-collars	2	20	1	40
Trapping to assess reproduction	2	5	7	70
Trapping for 10-day population census	2.2 ²	10	2	44
Transport of Carcasses to U.C. Davis for Necropsy	1	1	10	10
Construction of pre-release pens	4	3	2	24
Data entry and verification	1	25		25
Data summary, analysis, and reporting	1	25		25
Field Biologists Subtotal				740
Project management, consultation, analysis, and reporting – Williams	1	65		65
Project management and oversight – P.A. Kelly	1	8		8
GIS	1	6		6
Lower Stanislaus River Preserve Surveys and Habitat Evaluation				
Field Biologists				
5-day survey trapping and habitat evaluation	2	5	4	40
Data entry, editing, verification and summary	1	3	1	5
Field Biologists Subtotal				45
Project management, consultation, analysis, and reporting – Williams	1	5	1	5
Project management and oversight - Kelly	1	2	1	2
GIS	1	3	1	3
Caswell MSP Census				
Field Biologists				
7-day survey trapping and habitat evaluation	2.8 ³	7	3	48
Data entry, editing, verification and summary	1	4	1	4
Field Biologists Subtotal				52
Project management, consultation, analysis, and reporting – Williams	1	5	1	5
Project management and oversight – Kelly	1	1	1	1
GIS	1	0.5	1	0.5
Habitat Restoration and Management Consultations				
Research Ecologist – D.F. Williams	1	8	1	8
Co-PI - Williams – L.P. Hamilton (Field Biologist Classification)	1	10	1	10
Biological Planner – C. Lee	1	10	1	10
Project management and oversight – P.A. Kelly	1	2	1	2
GIS	1	1.25	1	1.25
Summary by Position and Office Staff Involvement for Projects Implementation				
Field Biologists (including Hamilton's Lee's Consultation)				837
Research Ecologist – D.F. Williams				83
Project management and oversight – Director P.A. Kelly				13
GIS -				10.75
Administrative Assistance for all Tasks				17
Book-keeping/clerical for all Tasks				17

¹ more than two people are required because of shift work

² three people needed for trap placement and pickup at two sites

³ three people needed for trap placement and pickup at three sites

Table 2. *Estimated expenses for biological reconnaissance surveys in the Lower Stanislaus River Preserve, population census for brush rabbits and woodrats at Caswell MSP, and consultation with Service and Sacramento River Partners about habitat restoration, management, and placement of refugia mounds during FY 2003.*

San Joaquin River NWR Censuses, Monitoring, and Habitat Evaluation—FY 2003				
Personnel Services				
Personnel	% Annual Time	Salary/Month	Total Cost	
Principal Investigator	25.00%	\$8,053.50	\$	24,160.50
Director	3.00%	\$6,009.00	\$	2,163.24
GIS Technician	2.31%	\$4,693.50	\$	1,301.04
Admin. Analyst	5.00%	\$3,200.00	\$	1,920.00
Bookkeeper	5.00%	\$2,275.50	\$	1,365.30
Biologists (2.85 positions)	100.00%	\$3,150.00	\$	107,730.00
Subtotal			\$	138,640.08
Benefits (45%)			\$	62,388.04
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)			\$	3,500.00
Other expenses (photocopying, postage, office supplies)			\$	700.00
Office rental expenses			\$	7,200.00
Telephone & Cell Phone expenses			\$	2,400.00
Subtotal			\$	13,800.00
Equipment and Supplies				
	Number	Price		
Tomahawk Live Traps	100	\$ 45.00	\$	4,500.00
Radio Collars	100	\$ 190.00	\$	19,000.00
Telemetry Antennae	2	\$ 450.00	\$	900.00
Radio-telemetry receivers	2	\$ 900.00	\$	1,800.00
Subtotal			\$	26,200.00
Travel				
	# Rooms	Total Days	Rate	
Accommodations	2	10	\$ 70.00	\$ 1,400.00
Per Diem		20	\$ 46.00	\$ 920.00
	Vehicle	# of Mo.	Rate	
Vehicle Rental	1	12	\$1,200.00	\$ 14,400.00
Vehicle Fuel		12	\$ 250.00	\$ 3,000.00
ATV Fuel & Maintenance	1	12	\$ 60.00	\$ 720.00
Vehicle Insurance (inc. ATV)				\$ 2,100.00
Vehicle Safety Supplies*				\$ 100.00
			\$	22,640.00
			\$	263,668.11
			\$	13,183.41
			\$	276,851.52
			\$	55,370.30
			\$	332,221.82

* Vehicle safety supplies include but are not limited to: club lock, first aid kit, jumper cables, fix-a-flat, fire extinguisher, and tire pressure gauge.

Table 2. *Continued.*

Lower Stanislaus River Preserve Surveys and Habitat Assessment			
Personnel Services			
Personnel	% Annual Time	Salary	Total Cost
Principal Investigator	1.93%	\$8,053.50	\$ 1,865.19
Director	0.77%	\$6,009.00	\$ 555.23
GIS Technician	1.16%	\$4,693.50	\$ 650.52
Admin. Analyst	0.50%	\$3,200.00	\$ 192.00
Bookkeeper	0.50%	\$2,275.50	\$ 136.53
Biologists (2)	17.31%	\$3,150.00	\$ 1,112.34
		Subtotal	\$ 4,511.81
Benefits (45%)			\$ 2,030.32
Operating Expenses			
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)			\$ 150.00
Other expenses (photocopying, postage, office supplies)			\$ 25.00
Office rental expenses			\$ 498.00
Telephone & Cell Phone expenses			\$ 40.00
		Subtotal	\$ 713.00
Travel			
	Total Days	Rate	
Vehicle Fuel (1,200 miles)		\$ 180.00	\$ 180.00
Vehicle Insurance			\$ 120.00
		Subtotal	\$ 300.00
		Subtotal of Direct Expenses	\$ 7,555.13
		ESRP Program Fee (5%)	\$ 377.76
		Subtotal of Expenses	\$ 7,932.88
		Fnd. Indirect Fees (20%)	\$ 1,586.58
		Total Expenses	\$ 9,519.46
Caswell Memorial State Park Censuses			
Personnel Services			
Personnel	% Annual Time	Salary	
Principal Investigator	3.08%	\$8,053.50	\$ 2,976.57
Director	0.77%	\$6,009.00	\$ 555.23
GIS Technician	0.19%	\$4,693.50	\$ 107.01
Admin. Analyst	0.50%	\$3,200.00	\$ 192.00
Bookkeeper	0.50%	\$2,275.50	\$ 136.53
Biologists (2)	20.00%	\$3,150.00	\$ 7,560.00
		Subtotal	\$ 11,527.35
Benefits (45%)			\$ 5,187.31
Operating Expenses			
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)			\$ 150.00
Other expenses (photocopying, postage, office supplies)			\$ 25.00
Office rental expenses			\$ 498.00
Telephone & Cell Phone expenses			\$ 40.00
		Subtotal	\$ 713.00
Travel			
	Total Days	Rate	
Vehicle Rental	1	21	\$ 60.00
			\$ 1,260.00

Table 2. *Continued.*

Vehicle Fuel (1,470 miles, 12 mpg)		\$ 1.80	\$ 221.40
Vehicle Insurance			\$ 120.00
		Subtotal	\$ 1,601.40
		Subtotal of Direct Expenses	\$ 19,029.05
		ESRP Program Fee (5%)	\$ 951.45
		Subtotal of Expenses	\$ 19,980.51
		Fnd. Indirect Fees (20%)	\$ 3,996.10
		Total Expenses	\$ 23,976.61
Habitat Restoration & Management Consultation			
Personnel Services			
Personnel	% Annual Time	Salary	
Principal Investigator Williams	3.08%	\$8,053.50	\$ 2,976.57
Principal Investigator Hamilton	3.85%	\$3,351.00	\$ 1,548.16
Director	0.77%	\$6,009.00	\$ 555.23
GIS Technician	0.48%	\$4,693.50	\$ 270.35
Biol. Planner Lee	3.85%	\$3,105.00	\$ 1,434.51
Admin. Analyst	0.50%	\$3,200.00	\$ 192.00
Bookkeeper	0.50%	\$2,275.50	\$ 136.53
		Subtotal	\$ 7,113.35
Benefits (45%)			\$ 3,201.01
Operating Expenses			
Other expenses (photocopying, postage, office supplies)			\$ 50.00
Office rental expenses			\$ 498.00
Telephone & Cell Phone expenses			\$ 40.00
		Subtotal	\$ 588.00
Travel			
	Total Days	Rate	
Vehicle Rental	1	21	\$ 60.00
Vehicle Fuel (1,470 miles, 12 mpg)			\$ 1.80
Vehicle Insurance			\$ 120.00
		Subtotal of Direct Expenses	\$ 12,503.76
		ESRP Program Fee (5%)	\$ 625.19
		Subtotal of Expenses	\$ 13,128.95
		Fnd. Indirect Fees (20%)	\$ 2,625.79
		Total Expenses	\$ 15,754.74
Combined Budgets for the Four Tasks			
Personnel	Total Days	Salary	Total Cost
PI - Williams--D.F. Williams	83	\$8,053.50	\$ 31,978.84
Director--P.A. Kelly	13	\$6,009.00	\$ 3,828.93
GIS Technician	10.75	\$4,693.50	\$ 2,328.91
Admin. Analyst	17	\$3,200.00	\$ 2,496.00
Bookkeeper	17	\$2,275.50	\$ 1,774.89
Biologists	837	\$3,150.00	\$ 119,385.01
		Subtotal	\$ 161,792.59
Benefits (45%)			\$ 72,806.67
Operating Expenses			\$ 15,814.00
Equipment and Supplies			\$ 26,200.00
Travel			\$ 26,142.80

Table 2. *Continued.*

	Subtotal of Direct Expenses	\$ 302,756.06
	ESRP Program Fee (5%)	\$ 15,137.80
	Subtotal of Expenses	\$ 317,893.86
	Fnd. Indirect Fees (20%)	\$ 63,578.77
	Total FY 03 Estimated Expenses	\$ 381,472.63

In Fiscal Year 2004 (Table 3), Task 4, Habitat Restoration and Management Consultation, has been eliminated to reflect the fact that we believe this consultation all can be achieved in FY2003. Salaries were increased by a projected 5%, which represents the combined cost of living increase (2.5%) and performance-based increase (2.5%). Increase in goods, services, and similar expenses due to inflation is 2%.

Table 3. *Estimated budget for monitoring and censuses of riparian brush rabbits on the San Joaquin River NWR during FY 2004.*

San Joaquin River NWR Censuses, Monitoring, and Habitat Evaluation—FY 2004				
Personnel Services				
Personnel	% Annual Time	Salary/Month	Total Cost	
Principal Investigator	25.00%	\$8,456.18	\$	25,368.54
Director	3.00%	\$6,309.45	\$	2,271.40
GIS Technician	2.31%	\$4,928.18	\$	1,366.09
Admin. Analyst	5.00%	\$3,360.00	\$	2,016.00
Bookkeeper	5.00%	\$2,389.28	\$	1,433.57
Biologists (2.85 positions)	100.00%	\$3,307.50	\$	113,116.50
Subtotal			\$	145,572.10
Benefits (45%)			\$	65,507.45
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)			\$	3,570.00
Other expenses (photocopying, postage, office supplies)			\$	714.00
Office rental expenses			\$	7,200.00
Telephone & Cell Phone expenses			\$	2,448.00
Subtotal			\$	13,932.00
Equipment and Supplies				
	Qty.	Price		
Tomahawk Live Traps	10	\$ 46.00	\$	460.00
Radio Collars	100	\$ 194.00	\$	19,400.00
			\$	19,860.00
Travel				
	# Rooms	Total Days	Rate	
Accommodations	2	10	\$ 70.00	\$ 1,400.00
Per Diem		20	\$ 46.00	\$ 920.00
	Vehicle	# of Mo.	Rate	
Vehicle Rental	1	12	\$1,200.00	\$ 14,400.00
Vehicle Fuel	1	12	\$ 250.00	\$ 3,000.00
ATV Fuel & Maintenance	1	12	\$ 60.00	\$ 734.00
Vehicle Insurance (inc. ATV)				\$ 2,142.00
Subtotal			\$	22,596.00
Subtotal of Direct Expenses			\$	267,467.55
ESRP Program Fee (5%)			\$	13,373.38
Subtotal of Expenses			\$	280,840.92
Fnd. Indirect Fees (20%)			\$	56,168.18
Total Expenses			\$	337,009.11
Lower Stanislaus River Preserve Surveys and Habitat Assessment				
Personnel Services				
Personnel	% Annual Time	Salary	Total Cost	
Principal Investigator	1.93%	\$8,456.18	\$	1,958.45
Director	0.77%	\$6,309.45	\$	582.99
GIS Technician	1.16%	\$4,928.18	\$	683.05
Admin. Analyst	0.50%	\$3,360.00	\$	201.60
Bookkeeper	0.50%	\$2,389.28	\$	143.36
Biologists (2)	17.31%	\$3,307.50	\$	1,167.96

Table 3. Continued.

			Subtotal	\$ 4,737.40
Benefits (45%)				\$ 2,131.83
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)				\$ 153.00
Other expenses (photocopying, postage, office supplies)				\$ 25.50
Office rental expenses				\$ 498.00
Telephone & Cell Phone expenses				\$ 41.00
			Subtotal	\$ 717.50
Travel	Total Days		Rate	
Vehicle Fuel (1,200 miles)		\$ 184.00		\$ 183.60
Vehicle Insurance				\$ 122.40
			Subtotal	\$ 306.00
			Subtotal of Direct Expenses	\$ 7,892.74
			ESRP Program Fee (5%)	\$ 394.64
			Subtotal of Expenses	\$ 8,287.37
			Fnd. Indirect Fees (20%)	\$ 1,657.47
			Total Expenses	\$ 9,944.85
Caswell Memorial State Park Censuses				
Personnel Services				
Personnel	% Annual Time	Salary	Total Cost	
Principal Investigator	3.08%	\$8,456.18	\$	3,125.40
Director	0.77%	\$6,309.45	\$	582.99
GIS Technician	0.19%	\$4,928.18	\$	112.36
Admin. Analyst	0.50%	\$3,360.00	\$	201.60
Bookkeeper	0.50%	\$2,389.28	\$	143.36
Biologists (2)	20.00%	\$3,307.50	\$	7,938.00
			Subtotal	\$ 12,103.72
Benefits (45%)				\$ 5,446.67
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)				\$ 153.00
Other expenses (photocopying, postage, office supplies)				\$ 26.00
Office rental expenses				\$ 498.00
Telephone & Cell Phone expenses				\$ 41.00
			Subtotal	\$ 718.00
Travel	Total Days		Rate	
Vehicle Rental	1 21	\$ 61.20	\$	1,285.20
Vehicle Fuel (1,470 miles, 12 mpg)		\$ 1.84	\$	226.00
Vehicle Insurance			\$	122.40
			Subtotal	\$ 1,633.60
			Subtotal of Direct Expenses	\$ 19,901.99
			ESRP Program Fee (5%)	\$ 995.10
			Subtotal of Expenses	\$ 20,897.09
			Fnd. Indirect Fees (20%)	\$ 4,179.42
			Total Expenses	\$ 25,076.51

Table 3. Continued.

Combined Budgets for the Three Tasks			
Personnel	Total Days	Salary	Total Cost
PI - Williams--D.F. Williams	75	\$8,053.50	\$ 30,452.40
Director--P.A. Kelly	11	\$6,009.00	\$ 3,437.39
GIS Technician	9.5	\$4,693.50	\$ 2,161.50
Admin. Analyst	15.7	\$3,200.00	\$ 2,419.20
Bookkeeper	15.7	\$3,360.00	\$ 1,720.28
Biologists	817	\$2,389.28	\$ 122,222.46
		Subtotal	\$ 162,413.22
Benefits (45%)			\$ 73,085.95
Operating Expenses			\$ 15,367.50
Equipment and Supplies			\$ 19,860.00
Travel			\$ 24,535.60
		Subtotal of Direct Expenses	\$ 295,262.27
		ESRP Program Fee (5%)	\$ 14,763.11
		Subtotal of Expenses	\$ 310,025.39
		Fnd. Indirect Fees (20%)	\$ 62,005.08
		Total FY 04 Estimated Expenses	\$ 372,030.46

In Fiscal Year 2005 (Table 4) Habitat Restoration and Management Consultation, has been eliminated, as was the case in FY 2004. Salaries were increased by a projected 4%, which represents the combined cost of living increase (2%) and performance-based increase (2%) .

Table 4. *Estimated budget for monitoring and censuses of riparian brush rabbits on the San Joaquin River NWR during FY 2005.*

San Joaquin River NWR Censuses, Monitoring, and Habitat Evaluation—FY 2005				
Personnel Services				
Personnel	% Annual Time		Salary	Total Costs
Principal Investigator	25.00%		\$ 8,794.00	\$ 26,382.00
Director	3.00%		\$ 6,562.00	\$ 2,362.32
GIS Technician	2.31%		\$ 5,125.00	\$ 1,420.65
Admin. Analyst	5.00%		\$ 3,495.00	\$ 2,097.00
Bookkeeper	5.00%		\$ 2,485.00	\$ 1,491.00
Biologists (2.85 positions)	100.00%		\$ 3,440.00	\$ 117,648.00
			Subtotal	\$ 151,400.97
Benefits (45%)				\$ 68,130.44
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)				\$ 3,570.00
Other expenses (photocopying, postage, office supplies)				\$ 714.00
Office rental expenses				\$ 7,200.00
Telephone & Cell Phone expenses				\$ 2,448.00
			Subtotal	\$ 13,932.00
Equipment and Supplies				
		Qty.	Price	
Tomahawk Live Traps		10	\$ 46.00	\$ 469.00
Radio Collars		100	\$ 198.00	\$ 19,800.00
				\$ 20,269.00
Travel				
	# Rooms	Total Days	Rate	
Accommodations	2	10	\$ 72.00	\$ 1,440.00
Per Diem		20	\$ 47.00	\$ 940.00
	Vehicle	# of Mo.	Rate	
Vehicle Rental	1	12	\$ 1,224.00	\$ 14,688.00
Vehicle Fuel		12	\$ 260.00	\$ 3,120.00
ATV Fuel & Maintenance	1	12	\$ 62.00	\$ 734.00
Vehicle Insurance (inc. ATV)				\$ 2,142.00
			Subtotal	\$ 23,064.00
			Subtotal of Direct Expenses	\$ 276,796.41
			ESRP Program Fee (5%)	\$ 13,839.82
			Subtotal of Expenses	\$ 290,636.23
			Fnd. Indirect Fees (20%)	\$ 58,127.25
			Total Expenses	\$ 348,763.47
Lower Stanislaus River Preserve Surveys and Habitat Assessment				
Personnel Services				
Personnel	% Annual Time		Salary	Total Costs
Principal Investigator	1.93%		\$ 8,794.00	\$ 2,036.69
Director	0.77%		\$ 6,562.00	\$ 606.33
GIS Technician	1.16%		\$ 5,125.00	\$ 710.33
Admin. Analyst	0.50%		\$ 3,495.00	\$ 209.70
Bookkeeper	0.50%		\$ 2,485.00	\$ 149.10
Biologists (2)	17.31%		\$ 3,440.00	\$ 1,214.75

Table 4. Continued.

			Subtotal	\$ 4,926.89
Benefits (45%)				\$ 2,217.10
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)				\$ 156.00
Other expenses (photocopying, postage, office supplies)				\$ 26.00
Office rental expenses				\$ 508.00
Telephone & Cell Phone expenses				\$ 42.00
			Subtotal	\$ 732.00
Travel	Total Days		Rate	
Vehicle Fuel (1,200 miles)		\$ 192.00		\$ 183.60
Vehicle Insurance				\$ 125.00
			Subtotal	\$ 308.60
			Subtotal of Direct Expenses	\$ 8,184.59
			ESRP Program Fee (5%)	\$ 409.23
			Subtotal of Expenses	\$ 8,593.82
			Fnd. Indirect Fees (20%)	\$ 1,718.76
			Total Expenses	\$ 10,312.59
Caswell Memorial State Park Censuses				
Personnel Services				
Personnel	% Annual Time	Salary	Total Costs	
Principal Investigator	3.08%	\$ 8,794.00	\$	3,250.26
Director	0.77%	\$ 6,562.00	\$	606.33
GIS Technician	0.19%	\$ 5,125.00	\$	116.85
Admin. Analyst	0.50%	\$ 3,495.00	\$	209.70
Bookkeeper	0.50%	\$ 2,485.00	\$	149.10
Biologists (2)	20.00%	\$ 3,440.00	\$	8,256.00
			Subtotal	\$ 12,588.24
Benefits (45%)				\$ 5,664.71
Operating Expenses				
Field supplies (Bait, batteries, temp. fencing & misc. field supplies)				\$ 156.00
Other expenses (photocopying, postage, office supplies)				\$ 26.52
Office rental expenses				\$ 508.00
Telephone & Cell Phone expenses				\$ 42.00
			Subtotal	\$ 732.52
Travel	Total Days		Rate	
Vehicle Rental	1	21	\$ 62.40	\$ 1,285.20
Vehicle Fuel (1,470 miles, 12 mpg)			\$ 1.92	\$ 226.00
Vehicle Insurance				\$ 122.40
			Subtotal	\$ 1,633.60
			Subtotal of Direct Expenses	\$ 20,619.07
			ESRP Program Fee (5%)	\$ 1,030.95
			Subtotal of Expenses	\$ 21,650.02
			Fnd. Indirect Fees (20%)	\$ 4,330.00
			Total Expenses	\$ 25,980.03

Table 4. Continued.

Combined Budgets for the Three Tasks			
Personnel	Total Days	Salary	Total Costs
PI - Williams--D.F. Williams	75	\$ 8,794.00	\$ 31,668.95
Director--P.A. Kelly	11	\$ 6,562.00	\$ 3,574.98
GIS Technician	9.5	\$ 5,125.00	\$ 2,247.83
Admin. Analyst	15.7	\$ 3,495.00	\$ 2,516.40
Bookkeeper	15.7	\$ 2,485.00	\$ 1,789.20
Biologists	817	\$ 3,440.00	\$ 127,118.75
		Subtotal	\$ 168,916.10
Benefits (45%)			\$ 76,012.25
Operating Expenses			\$ 15,396.52
Equipment and Supplies			\$ 20,269.00
Travel			\$ 25,006.20
		Subtotal of Direct Expenses	\$ 305,600.07
		ESRP Program Fee (5%)	\$ 15,280.00
		Subtotal of Expenses	\$ 320,880.07
		Fnd. Indirect Fees (20%)	\$ 64,176.01
		Total FY 05 Estimated Expenses	\$ 385,056.09

A summary of requested funding by year and category is presented in Table 5 for the three fiscal years for which funding is requested. We estimate this will leave one or more years in the future without committed funding.

Table 5. Summary budget for accomplishing the four tasks outlined in this proposal over the fiscal years 2003-2005

Budget Category	FY 2003	FY 2004	FY 2005	Project Totals
Personnel	\$ 161,792.59	\$ 162,413.22	\$ 168,916.10	\$ 493,121.91
Benefits	\$ 72,806.67	\$ 73,085.95	\$ 76,012.25	\$ 221,904.87
Operating Expenses	\$ 15,814.00	\$ 15,367.50	\$ 15,396.52	\$ 46,578.02
Equipment	\$ 26,200.00	\$ 19,860.00	\$ 20,269.00	\$ 66,329.00
Travel	\$ 26,142.80	\$ 24,535.60	\$ 25,006.20	\$ 75,684.60
Subtotal	\$ 306,756.06	\$ 295,262.27	\$ 305,600.07	\$ 907,618.40
ESRP Program Fee (5%)	\$ 15,137.80	\$ 14,763.11	\$ 15,280.00	\$ 45,180.91
Subtotal of Direct Costs	\$ 317,893.86	\$ 310,025.39	\$ 320,880.07	\$ 948,799.32
CSUS Foundation Indirect Costs (20%)	\$ 63,578.77	\$ 62,005.08	\$ 64,176.01	\$ 189,759.86
Estimated Totals	\$ 381,472.63	\$ 372,030.46	\$ 385,056.09	\$ 1,138,559.18

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